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RESEARCH ARTICLE

ACCESSORY OSTIA IN THE AORTIC SINUSES IN AUTOPSIED HEARTS AT THE UNIVERSITY TEACHING HOSPITAL, LUSAKA, ZAMBIA

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ABSTRACT

Background: Accessory coronary ostia refer are ostia located in the aortic sinuses other than those of the left and right coronary arteries. The most common ostia found in the aortic sinuses are those of the conal and sinoatrial node arteries. Knowledge and recognition of these two arteries is important when performing coronary angiography.
Aim and Objective: The aim of this study was to determine the incidence of accessory ostia in the aortic sinuses in autopsied hearts.
Materials and Methods: A total of 127 human hearts were dissected and grossly examined during autopsy from subjects aged between 17 and 86 years.
Results: Accessory ostia were found in 39.4% (50/127) hearts and all of them were located in right aortic sinus. Conal artery ostia were observed in 30.7% (39/127) whilst the sinoatrial node artery ostia was observed in 8.7% (11/127) of the specimens.
Conclusions: Accessory coronary ostia were observed in only in the right aortic sinus in 39.4% (50/127) of the hearts.

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INTRODUCTION

The conus (conal) artery may arise as the first branch from the right coronary artery or from a separate ostium located in the right aortic sinus. It arises from a separate ostium in the right aortic sinus in 36% of individuals. It may anastomose with a similar left coronary branch from the anterior interventricular artery to form the "annulus of Vieussens" around the right ventricular outflow tract (Standring, 2008). The conus artery supplies pulmonary conus and the upper part of the right ventricle and supplies the subpulmonary infundibulum (Loukas *et al.,* 2014; Standring, 2008). This anastomotic circle formed by the conal arteries ("annulus of Vieussens") is one of the many eponyms named after Raymond de Vieussens, a French anatomist and physician who described the pericardium, coronary vessels and muscle of the heart in detail (Loukas *et al.,* 2007; Enciu*et al.,* 2014).

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The sinoatrial node artery may arise from a separate ostium in the right aortic sinus (Loukas *et al.,* 2014) and sometimes as a branch of the right coronary artery and also as a branch from the circumflex arteryand supplies the sinoatrial node (Standring, 2008). The aim of our study was to determine the incidence of accessory ostia in the aortic sinuses and compare with other studies.

MATERIALS AND METHODS

This study was carried between October 2015 and February 2016 on 127 human hearts (96 from males and 31 from females) during autopsy from subjects aged between 17 and 86 years. The hearts were dissected and examined grossly during post-mortem. A longitudinal incision was made through the non coronary aortic sinus to observe the ostia in the aortic sinuses. Photographs were taken after dissection using a digital camera Canon power shot SX400IS 16 mega pixels. Ethical clearance was granted by Excellence in Research Ethics and Science (ERES CONVERGE).

RESULTS

Conal artery ostia were found in 30.7% (39/127) and sinoatrial node artery ostia were found in 8.7% (11/127) hearts all located in the right aortic sinus (Table 1). Figures 1-4 show conal artery ostia in the right aortic sinus though in Figure 2 the conal artery ostia is located in the right coronary artery wall. In Figures 1-3, the sinoatrial node artery ostia were located in the right aortic sinus. No accessory ostia were found in the left aortic sinus.

Table 1. Incidence of conal and sinoatrial node artery ostia in the aortic sinuses

	Right aortic sinus		Left aortic sinus	
	Conal artery	Sinoatrial node artery	Conal artery	Sinoatrial node artery
Frequency	39	11	0	0
Percentage (%)	30.7	8.7	0	0

* 30.7 % of the conal artery ostia and 8.7% of the sinoatrial node artery ostia were located in the right aortic sinus. No accessory ostia were found in the left aortic sinus.

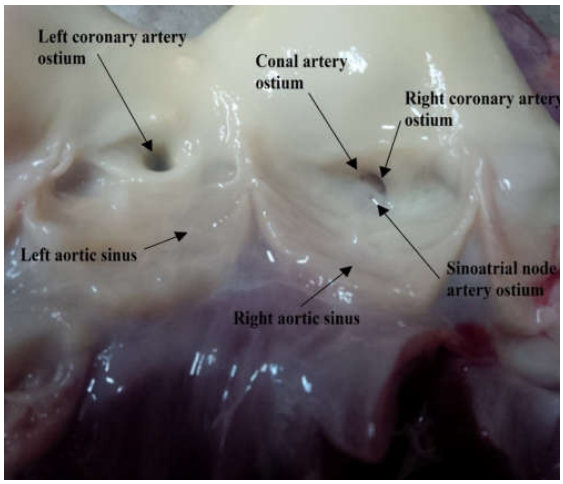

Fig.1.Conal and sinoatrial node artery ostia in the right aortic sinus

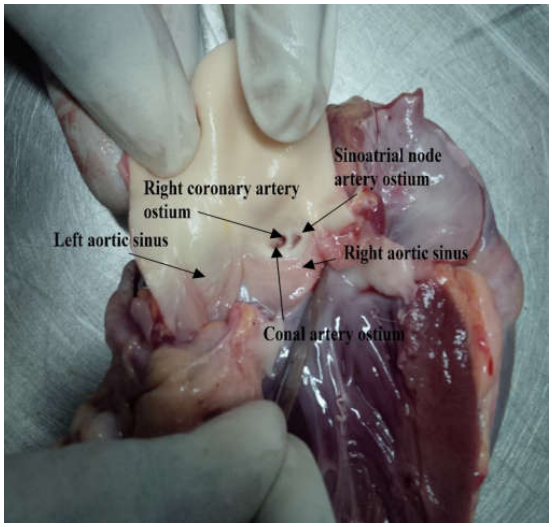

Fig.2. Right coronary artery and Sinoatrial node artery ostia in right aortic sinus. Conus artery ostium in right coronary artery wall

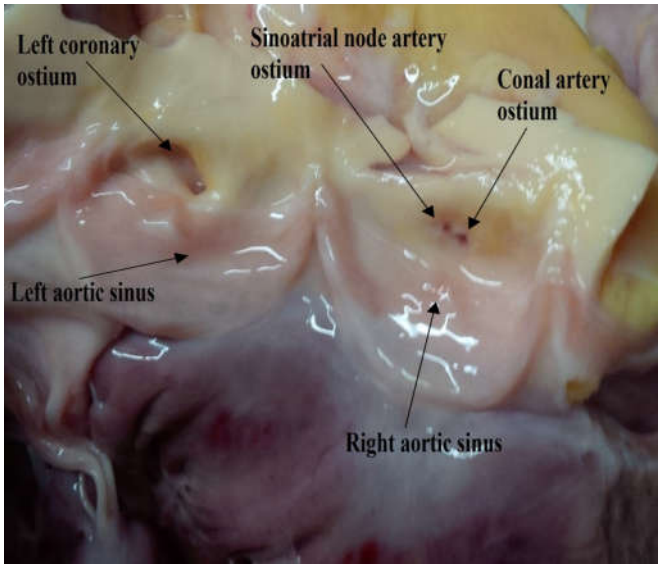

Fig. 3. Conus and Sinoatrial node artery ostia in right aortic sinus. The right coronary artery arose from a common ostium with the left coronary artery in the left aortic sinus

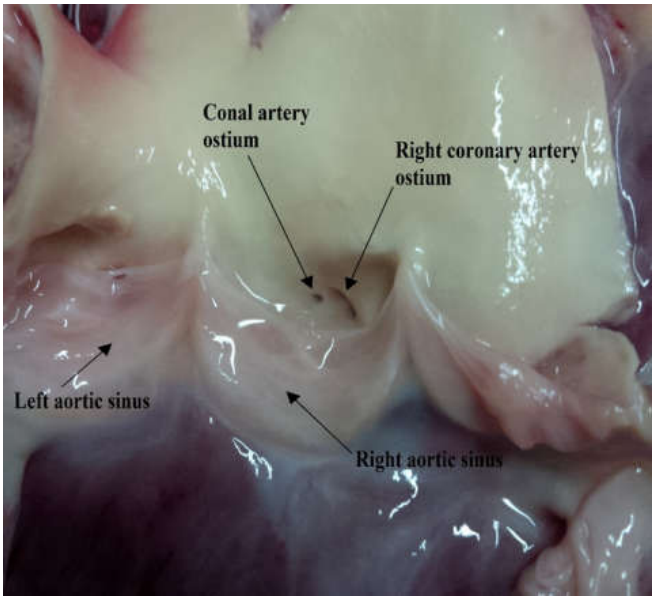

Fig.4. Conus artery arising from a separate ostium in right aortic sinus

DISCUSSION

Accessory ostia in the aortic sinuses were observed only in the right aortic sinus. Out of the 127 hearts examined, accessory ostia were observed in 39.4% (50/127) hearts. Conal artery ostia was located in the right aortic sinus 30.7% (39/127) and the sinoatrial node artery ostia was located in the right aortic sinus in 8.7% (11/127) hearts. No accessory ostia were observed in the left aortic sinus (Table 1). Standring (2008) reports of the conus artery arising separately from the anterior right aortic sinus in 36% of individuals. In a study done by Loukas *et al.* (2007) reported origin of the conal artery as an independent artery from the right aortic sinus in 40.3% (242/600) out of the 300 coronary angiograms and 300 formalin fixed hearts they examined. Kosar *et al.* (2009)

reported incidence of conus artery having separate ostium in right aortic sinus in 22% (152/700) and the sinoatrial node artery had separate ostium in right aortic sinus in 0.4% (3/700) of the patients who underwent 64 - slice coronary computed tomography data. Kulkarni and Paranjpe (2015) in India after grossly examining 90 hearts obtained from cadavers found accessory ostia in 24.4% (22/90) of the hearts and all the ostia were located in the right aortic sinus. Muriago *et al.* (1997) found an accessory coronary orifice in the right aortic sinus in 74% (17/23) and a third orifice in five (5) out of the 23 hearts they examined at autopsy. In our study a third coronary orifice was seen in 11 (8.7%) of the hearts. Turner and Navaratnam (1996) found accessory ostia in six (15.8%) of the 38 cadavers they examined. From the articles cited, it can be seen that the incidence of accessory coronary ostia ranges from 15.8% to 74% though can be disputed due to some studies using small sample sizes. Angelini *et al.* (1999) after compiling data from other studies stated that the conal artery may arise from a separate ostium in 23 to 51% of normal hearts. Loukas *et al.* (2014) emphasises the importance of the recognising the conal artery during coronary angiography and also in congenital heart conditions such as Tetralogy of Fallot. In patients with occlusion of the anterior interventricular artery or right coronary artery, the conus artery often serves as a principal source of collateral circulation (Levin *et al.,* 1981). This importance of the conal artery was seen in a case Singla and Sasidharan (2013) reported in which the conus artery provided principal source of collateral circulation when the anterior interventricular artery was occluded. Kulkarni and Paranjpe (2015) stated that presence of multiple ostia in the aortic sinuses can affect myocardial perfusion and that failure to recognise coronary artery origin variations can prolong the arteriography procedure and lead to errors in the interpretation of the coronary angiograms. In our study it was seen for instance in figure 2 were the sinoatrial node artery ostium was almost equal in size with that of the right coronary artery hence it would be challenging for angiographers to distinguish which of the two ostia belongs to which artery during catheterisation.

Conclusions

Accessory coronary ostia were observed only in the right aortic sinus in 39.4% (50/127) of the hearts dissected and grossly examined during post-mortem.

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